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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,596	07/23/2004	Mou-Shiung Lin	MEGP0027USA4	4595

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EXAMINER	
MATTHEWS, COLLEEN ANN	
ART UNIT	**PAPER NUMBER**
2811	

NOTIFICATION DATE	DELIVERY MODE
01/03/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/710,596	LIN, MOU-SHIUNG	
	Examiner	Art Unit	
	Colleen A. Matthews	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *43-74,83,84 and 89-102* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *43-74,83,84 and 89-102* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

LYNNE GURLEY
SUPERVISORY PATENT EXAMINER
AU 2811, TC 2800

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The amendment filed 09/13/2007 could have been held non-complaint under 37 CFR 1.121, Amendments to the claims filed on or after July 30, 2003 must comply with 37 CFR1.121(c) which states: *"The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters." See MPEP 714.*

Claim 61 has text that with strike-through (copper in line 3) but this text was already deleted in a prior amendment on 03/16/2007. Therefore the text should not have been present in the current amendment filed 09/13/2007. For sake of expediting prosecution, the claim will be examined. However, applicant is requested to review all claims to ensure that any claims that have been amended without proper text indications are corrected.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 43, 48-55, 89 and 94-99 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery).

Re claim 43: Lin discloses a chip structure comprising:

a silicon substrate (10, col 4 line 49);

a resistor in said silicon substrate (not shown but described in col 4 lines 49-51),

a MOS device (not shown but described in col 4 lines 49-51) comprising a portion in said silicon substrate;

a metallization structure (14) over said silicon substrate, wherein said metallization structure comprises a first metal layer (interconnect portion 13 of first layer of 14) and a second metal layer (interconnect portion 13 of second layer of 14) over said first metal layer;

a dielectric (white portion of layer 14) layer between said first and second metal layers;

a passivation layer (18, col 5 lines 4-5) over the metallization structure and over said dielectric layer, wherein said passivation layer comprises silicon nitride; and

a circuit trace (26/22/16/36/28/38) over the passivation layer, wherein said circuit trace is connected to said resistor (col 4 lines 66-67, col 5 line 1-2 describe point of contact 16 as connected to the transistors and other devices on the surface of substrate 10, which would include the resistor. col 5 lines describe contact point 16 also in electrical contact with 22/36/38, which is the circuit trace. Thus the resistor on surface of substrate is connected to the circuit trace through contact 16).

Lin fails to disclose the resistor in said silicon substrate comprises silicon with a dopant. Woolery teaches a chip structure (Figures 4A-4J) with a silicon substrate (400) and a resistor ("Resistor") in said silicon substrate, where said resistor comprises silicon with a dopant (arsenic, col 9 lines 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to have a resistor in the silicon substrate where said resistor comprises silicon with a dopant as in Woolrey in order to be able to predetermine and set the device resistivity.

Re claim 89: Lin discloses a chip structure comprising:

a silicon substrate (10, col 4 line 49);

a resistor in said silicon substrate (not shown but described in col 4 lines 49-51),

a MOS device (not shown but described in col 4 lines 49-51) comprising a portion in said silicon substrate;

a metallization structure (14) over said silicon substrate, wherein said metallization structure comprises a first metal layer (interconnect portion 13 of first layer of 14) and a second metal layer (interconnect portion 13 of second layer of 14) over said first metal layer;

a dielectric (white portion of layer 14) layer between said first and second metal layers;

a passivation layer (18, col 5 lines 4-5) over the metallization structure and over said dielectric layer; and

a circuit trace (26/22/16/36/28/38) over the passivation layer, wherein said circuit trace is connected to said resistor (col 4 lines 66-67, col 5 line 1-2 describe point of

contact 16 as connected to the transistors and other devices on the surface of substrate 10, which would include the resistor. col 5 lines describe contact point 16 also in electrical contact with 22/36/38, which is the circuit trace. Thus the resistor on surface of substrate is connected to the circuit trace through contact 16), and wherein said circuit trace comprises a third metal layer (copper, tungsten, nicket col 6 lines 55-57) and a copper layer (electroplating copper, col 6 lines 57) over said third metal layer.

Lin fails to disclose the resistor in said silicon substrate comprises silicon with a dopant. Woolery teaches a chip structure (Figures 4A-4J) with a silicon substrate (400) and a resistor ("Resistor") in said silicon substrate, where said resistor comprises silicon with a dopant (arsenic, col 9 lines 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to have a resistor in the silicon substrate where said resistor comprises silicon with a dopant as in Woolrey in order to be able to predetermine and set the device resistivity.

Re claims 48-53 and 94-99: Lin discloses a polymer layer (20) between the passivation/silicon-nitride layer (18) and the circuit trace (26/22/21/36/28) and on the circuit trace where the polymer layer comprises polyimide (PI) or benzocyclobutene (BCB), (col 5, lines 19 and 23-27).

Re claims 54-55: Lin discloses the circuit trace comprising a copper layer and a nickel layer over the copper layer (col 6 lines 55-58).

Claims 64, 56-62, 69-74, 83 and 100-101 are rejected under 35 U.S.C. 103(a)

as being unpatentable over U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) and U.S. Pat. No. 5,972,734 to Carichner et al. (Carichner).

Re claim 64: Lin discloses a chip structure comprising:

a silicon substrate (10, col 4 line 49);

a resistor in said silicon substrate (not shown but described in col 4 lines 49-51),

a MOS device (not shown but described in col 4 lines 49-51) comprising a portion in said silicon substrate;

a metallization structure (14) over said silicon substrate, wherein said metallization structure comprises a first metal layer (interconnect portion 13 of first layer of 14) and a second metal layer (interconnect portion 13 of second layer of 14) over said first metal layer;

a dielectric (white portion of layer 14) layer between said first and second metal layers;

a passivation layer (18, col 5 lines 4-5) over the metallization structure and over said dielectric layer, wherein said passivation layer comprises silicon nitride; and

a circuit trace (26/22/16/36/28/38) over the passivation layer, wherein said circuit trace is connected to said resistor (col 4 lines 66-67, col 5 line 1-2 describe point of contact 16 as connected to the transistors and other devices on the surface of substrate 10, which would include the resistor. col 5 lines describe contact point 16 also in

electrical contact with 22/36/38, which is the circuit trace. Thus the resistor on surface of substrate is connected to the circuit trace through contact 16).

Lin fails to disclose the resistor in said silicon substrate comprises silicon with a dopant. Woolery teaches a chip structure (Figures 4A-4J) with a silicon substrate (400) and a resistor ("Resistor") in said silicon substrate, where said resistor comprises silicon with a dopant (arsenic, col 9 lines 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to have a resistor in the silicon substrate where said resistor comprises silicon with a dopant as in Woolrey in order to be able to predetermine and set the device resistivity.

Lin also fails to disclose where said circuit trace comprises a titanium-containing layer and a gold layer over said titanium-containing layer. Carichner teaches a circuit trace (212) comprises a titanium-containing layer and a gold layer over said titanium-containing layer (col 4 lines 41-46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to include the different circuit trace and metallization layers of Charichner in order to optimize the device performance under thermal stress.

Re claims 69-74: Lin discloses a polymer layer (20) between the passivation/silicon-nitride layer (18) and the circuit trace (26/22/21/36/28) and on the circuit trace where the polymer layer comprises polyimide (PI) or benzocyclobutene (BCB), (col 5, lines 19 and 23-27).

Re claims 56-62, 83, and 100-101: Lin as modified discloses the device of 43, 65 and 89 as above where the circuit trace comprises a nickel layer over a copper layer.

Lin fails to disclose the circuit trace comprising a gold layer over the copper layer, a titanium layer under the copper layer, a titanium-containing layer comprising tungsten, a chromium layer under the copper layer, a gold layer, a titanium-containg layer under gold layer and a titanium-containing layer comprising tungsten. Carichner teaches a circuit trace (212) comprises a nickel layer over a copper layer. Lin fails to disclose the circuit trace comprising a gold layer over the copper layer, a titanium layer under the copper layer, a titanium-containing layer comprising tungsten, a chromium layer under the copper layer, a gold layer, a titanium-containg layer under gold layer and a titanium-containing layer comrpsing tungsten (col 4 lines 41-46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to include the different circuit trace and metallization layers of Charichner in order to optimize the device performance under thermal stress.

Claims 63, 84 and 102 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) as applied to claims 48 and 89 above and U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) and U.S. Pat. No. 5,972,734 to Carichner et al. (Carichner) as applied to claim 64 above in further view of and U.S. Pub. No. 2002/0047210 to Yamada et al. (Yamada).

Re claims 63, 84 and 102: Lin as modified fails to disclose where the metallization structure comprises aluminum. Yamada discloses metallization structures

comprising aluminum (for example in paragraphs [0163] and [0176]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt Lin to include aluminum in the metallization in order to provide desirable conductivity.

Claims 44-46, 65-67, 90-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) as applied to claims 44 and 89 above and U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) and U.S. Pat. No. 5,972,734 to Carichner et al. (Carichner) as applied to claim 64 above and in further view of U.S. Pub. No. 2003/0155570 to Leidy.

Re claims 44-46, 65-67, 90-92, Lin as modified discloses the device of 43, 65, and 89 as above. The modification of Woolery also discloses the resistor comprising silicon with a dopant of arsenic (col 9 lines 51 line 6). Lin as modified fails to disclose the resistor comprising silicon with a dopant of boron, phosphorous. Leidy teaches a resistor comprising silicon and a dopant of boron, phosphorous, or arsenic (page 5; claim 26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to have the resistor made of silicon and a dopant of boron, phosphorous, or arsenic as in Leidy in order to be able to predetermine the device resistivity (Leidy, page 3, paragraph 37).

Claims 45, 47, 66, 68, 91 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) as applied to claims 48 and 89 above and U.S. Pat. No. 6,495,442 to Lin et al (Lin) in view of U.S. Pat. No. 6,528,380 to Woolery et al. (Woolery) and U.S. Pat. No. 5,972,734 to Carichner et al. (Carichner) as applied to claim 64 above in further view of and U.S. Pub. No. 2003/0183332 to Simila.

Re claims 45, 47, 66, 68, 91 and 93: Lin discloses the device of 43 and 65 as above. The modification of Woolery also discloses the resistor comprising silicon with a dopant of arsenic (col 9 lines 51 line 6). Lin as modified fails to disclose the resistor comprising silicon with a dopant of phosphorous or gallium. Simila a resistor comprising silicon and a dopant of phosphorous or gallium (paragraph 70). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin to have the resistor made of silicon and a dopant of phosphorous or gallium as in Simila in order to be able to predetermine the device resistivity.

Response to Arguments

Applicant's arguments with respect to claims 43-74, 83-84, and 89-102 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen A. Matthews whose telephone number is 571-272-1667. The examiner can normally be reached on Monday - Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CAM
12/17/2007

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